SPACE-RAY®
INFRARED GAS HEATERS

SUBMITTAL DATA

INFRARED RADIANT TUBE HEATER

☐ PTS 40-200 SERIES *(CHECK ONE)*

☐ PTU 40-200 SERIES *(CHECK ONE)*

☐ NATURAL GAS *(CHECK ONE)*

☐ PROPANE GAS *(CHECK ONE)*

☐ Standard Construction

☐ ALC Construction (All Calorized Emitter Tubes)

PROJECT:	DATE:
ADDRESS:	
ARCHITECT/ENGINEER:	
ADDRESS:	
CONTRACTOR:	
ADDRESS:	
SUBMITTED BY:	

EQUIPMENT USED:

ACCESSORIES:

☐ Chain Mounting Kit:	☐ Vent Cap:
☐ Thermostat:	☐ Combustion Air Cap:
☐ Gas Pressure Regulator:	☐ 90° Elbow:
☐ Gas Shut-Off Valve:	☐ Corner Reflector:
☐ Side Reflector:	☐ Other:

1.0) GENERAL INFORMATION

This heater complies with ANSI Z83.20 (current standard) and CSA 2-34.

This heater is a self-contained infrared radiant tube heater for use in locations where flammable gases or vapors are not generally present (as defined by OSHA acceptable limits) and is intended for the heating of **nonresidential** spaces.

INSTALLATION REQUIREMENTS

The installation must conform to local building codes or, in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA54 or the Natural Gas and Propane Installation Code CSAB149.1. Heaters shall be installed by a licensed contractor or licensed installer. Clearances to combustibles as outlined in this manual should always be observed. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles."

Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater. Each installer shall use quality installation practices when locating the heater and must give consideration to clearances to combustible materials, vehicles parked below, lights, overhead doors, storage areas with stacked materials, sprinkler heads, gas and electrical lines, and any other possible obstructions or hazards. Consideration also must be given to service accessibility.

The heater, when installed in aircraft hangars and public garages, must be installed in accordance with ANSI/NFPA 409-latest edition (Standard for Aircraft Hangars), ANSI/NFPA 88a-latest edition (Standard for Parking Structures), and ANSI/NFPA 88b-latest edition (Standard for Repair Garages) with the following clearances:

a. At least 10 feet above the upper surfaces of wings or engine enclosures of the highest aircraft that may be housed in the hangar and at least 8 feet above the floor in shops, offices, and other sections of hangars communicating with aircraft storage or service areas.
b. At least 8 feet above the floor in public garages. ▲WARNING: Minimum clearances marked on the heater must be maintained from vehicles parked below the heater.

(FOR CANADA ONLY)

a. Installation of this appliance is to be in accordance with latest edition of CAN 1-B149.1 (Installation Code for Natural Gas Burning Appliances and Equipment), and/or CAN B149.2 (Installation Code for Propane Gas Burning Appliances and Equipment).
b. For installation in public garages or aircraft hangars, the minimum clearances from the bottom of the infrared heater to the upper surface of the highest aircraft or vehicle shall be 50 percent greater than the certified minimum clearance, but the clearance shall not be less than 8 feet.

Although these heaters may be used in many applications other than space heating (e.g., process heating), Space-Ray will not recognize the warranty for any use other than space heating.

This heater is for Indoor Installation and Covered Patio Installation only and can be used in either Vented or Unvented mode. The term Unvented actually means Indirect Vented. While the products of combustion are expelled into the building, national codes require ventilation in the building to dilute these products of combustion. This ventilation may be provided by gravity or mechanical means.

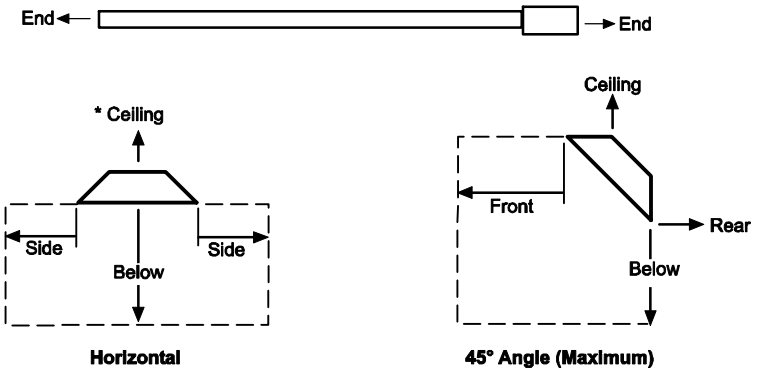
This heater is not an explosion proof heater. Where the possibility of exposure to volatile and low flash point materials exists, it could result in property damage or death. This heater must not be installed in a spray booth where the heater can operate during the spraying process. Consult your local fire marshal or insurance company.

PTS Series Only: Since straight tube heaters are always hotter at the control end than at the flue terminal end, always observe the minimum recommended mounting heights shown on the specification sheets and in Section 3.0 of this manual. Use U-tube configuration instead of straight tubes for spot or area heating (e.g., where a single heater is utilized for space heating).

WARNING: Certain materials or objects, when stored under the heater, will be subjected to radiant heat and could be seriously damaged. Observe the Minimum Clearances to Combustibles listed in the manual and on the heater at all times.

2.0) MINIMUM CLEARANCES TO COMBUSTIBLES

Minimum clearances to combustibles shall be measured from the outer surfaces as shown in the following diagram:



MINIMUM CLEARANCES TO COMBUSTIBLES						
Model No.	Mounted Horizontally				Angle Mounted at 45°	
	Sides	Ceiling *	Below **	Ends	45° Front	45° Rear
PTS/PTU 40	22"	6"	52"	15"	40"	12"
PTS/PTU 50	22"	6"	56"	15"	48"	12"
PTS/PTU 75	22"	6"	60"	15"	52"	12"
PTS/PTU 100	28"	6"	70"	15"	58"	12"
PTS/PTU 125	28"	6"	76"	20"	66"	12"
PTS/PTU 150	34"	6"	81"	20"	70"	12"
PTS/PTU 175	38"	6"	86"	20"	75"	12"
PTS/PTU 200	42"	6"	93"	20"	80"	12"

* When used indirect vented, minimum clearance for CEILING must be: 12" for PTS/PTU 50-75 and 18" for PTS/PTU 100-200. If optional corner and u-bend reflectors are not used, the clearance must be 18".

** Maximum clearance below reduces by 50% once you are 25ft. downstream from the control box.

NOTE: The clearances specified above must be maintained to combustibles and other materials that may be damaged by temperatures 90°F above ambient temperature. Clearances to combustibles are posted on the control box. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles." Space-Ray recommends posting these signs adjacent to the heater thermostat or other suitable location that will provide enhanced visibility.

3.0) SPECIFICATIONS

Model No.	Single Stage Btu/hr Input	Two Stage		Orifice Size				Minimum * Mounting Height		Turbulator Qty.
		Btu/hr High Input	Btu/hr Low Input	*Natural Gas*		*Propane Gas*		@ *Horizontal*	@ *45° Angle*	
PTS/PTU 40	40,000	40,000	25,000	#32	(0.116)	#49	(0.073)	10 ft.	9 ft.	4
PTS/PTU 50	50,000	50,000	30,000	3.5mm	(0.138)	46	(0.081)	11 ft.	10 ft.	5
PTS/PTU 75	75,000	75,000	50,000	#21	(0.159)	2.5mm	(0.098)	13 ft.	12 ft.	5
PTS/PTU 100	100,000	100,000	65,000	#12	(0.189))	#32	(0.116)	14 ft.	13 ft.	3
PTS/PTU 125	125,000	125,000	80,000	#4	(0..209)	#30	(0.129)	14 ft.	13 ft.	7
PTS/PTU 150	150,000	150,000	100,000	"A"	(0.234)	#27	(0.144)	15 ft.	14 ft.	4
PTS/PTU 175	175,000	175,000	110,000	"E"	(0.250)	#23	(0.154)	16 ft.	15 ft.	0
PTS/PTU 200	200,000	200,000	125,000	6.9mm	(0.272)	4.1mm	(0.161)	18 ft.	16 ft.	1

* MOUNT HEATERS AS HIGH AS POSSIBLE. Minimums are shown as a guideline for human comfort and uniform energy distribution for complete building heating applications. Consult your Space-Ray representative for the particulars of your installation requirements.

CONTROL OPTIONS

Control Suffix	Type of gas	Description
N5	Natural	Single Stage Gas Valve - Single Stage Input
L5	Propane	Single Stage Gas Valve - Single Stage Input
N7	Natural	Two Stage Gas Valve – Modulating Input - High/Low Fire
L7	Propane	Two Stage Gas Valve – Modulating Input - High/Low Fire

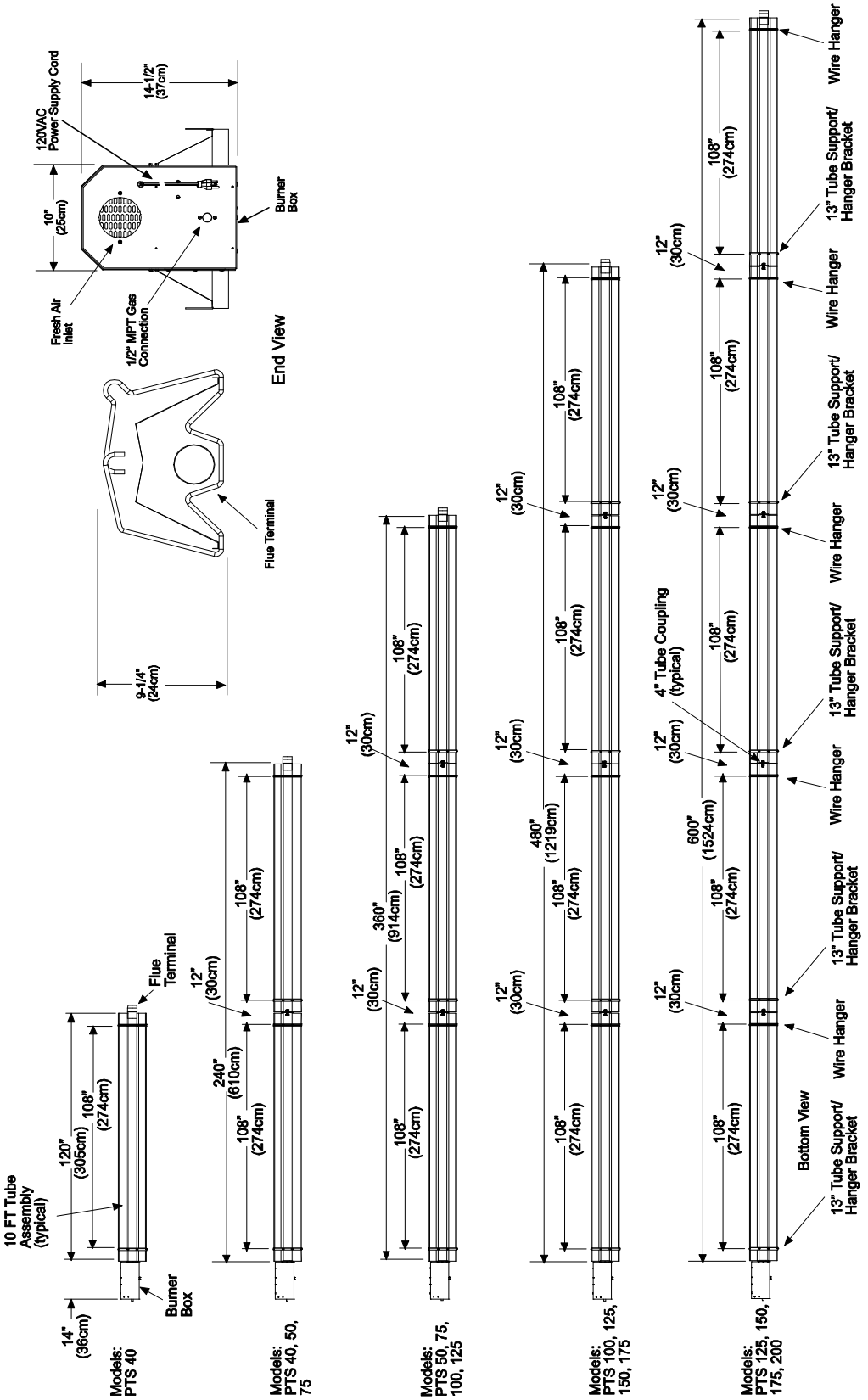
Gas-Pipe Connection:	Tube Diameter:	Flue Connection: [1]	Fresh Air Connection: [1]	Electrical Supply:	Current Rating:
½" NPT (Female)	4"	4" Round	4" Round	120 Volt, 60Hz, 1 Phase	1.74 Amp

1) See section 16 for vent sizes when multiple heaters are connected into a common vent.

Module Electrical Rating:	Ignition System (direct spark):
Input Power-Control: 18-30 VAC 50/60 Hz (class 2 transformer) Input Power-Line: 120 VAC (L1, IND contacts only) Gas Valve Rating: 2.0 A @ 24 VAC (max.) Combustion Blower Rating: 3.0 FLA @ 120 VAC 1/4 H.P. Motor Flame Sensitivity: 0.7 microamps minimum	15 second trial for ignition period 15 second pre-purge period 60 second inter-purge period 30 second post-purge period 3 tries for ignition (separate flame sensor).

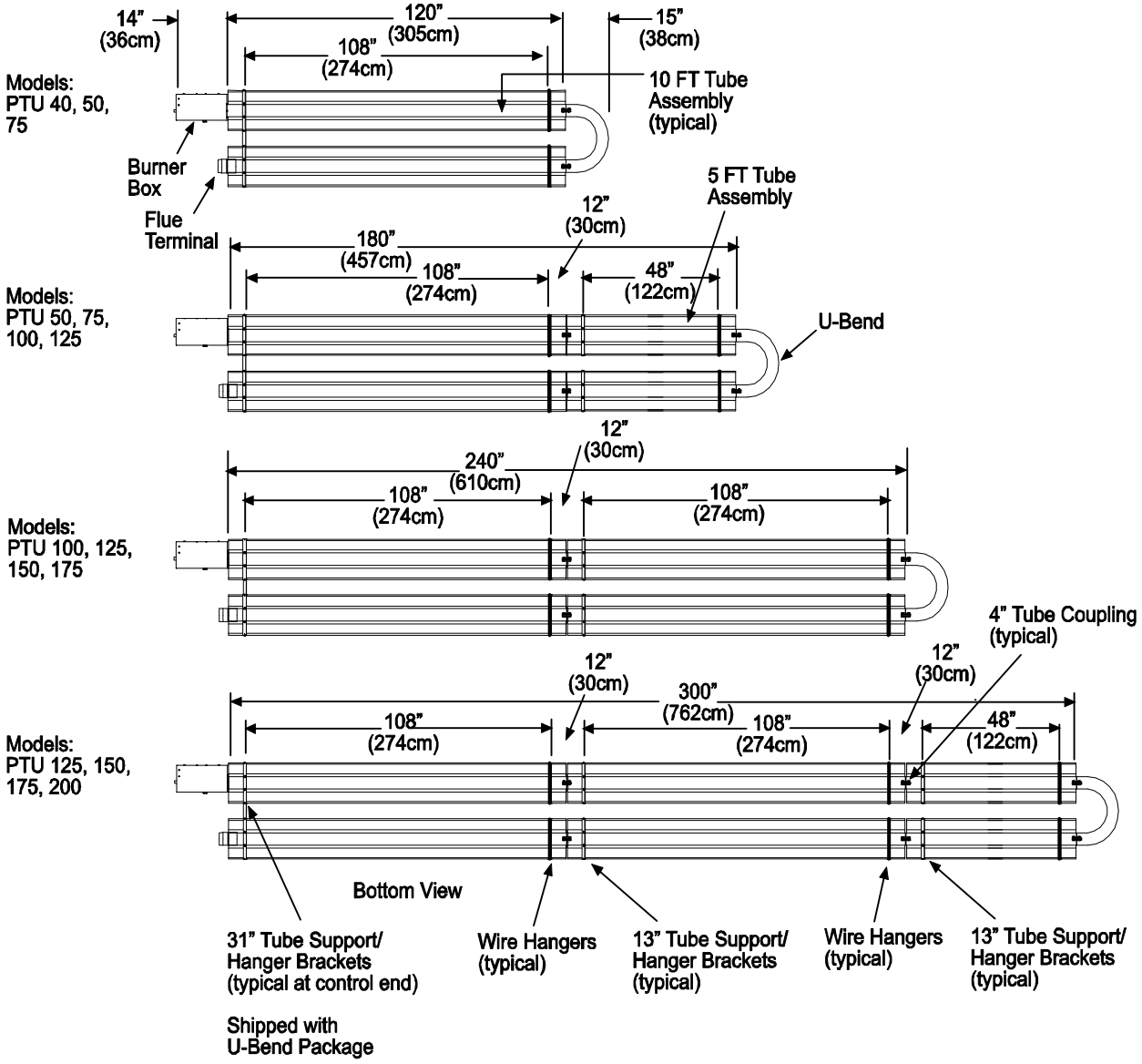
4.0) DIMENSIONS – PTS Series

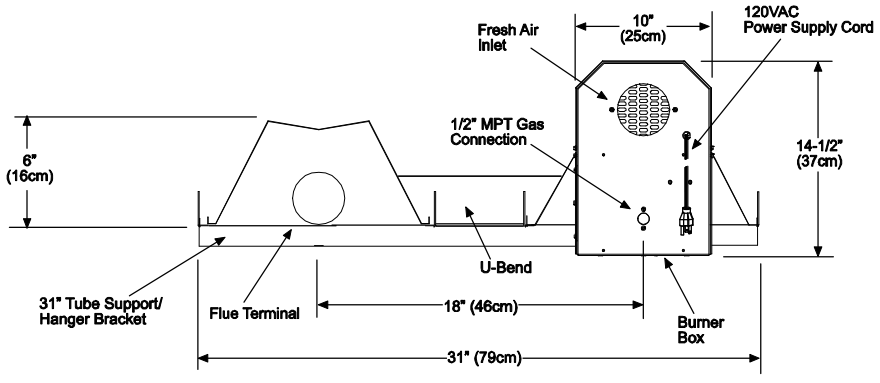
Typical Dimensions Up to 50 Ft. Shown.



5.0) DIMENSIONS – PTU Series

Typical Dimensions Up to 50 Ft. Shown.



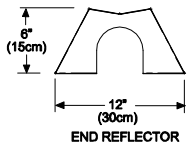


PTU (end view)

6.0) ACCESSORY PACKAGES

A) End Reflector Accessory Package, Part #43341010
(1 pkg. per PTS Series or 2 pkgs. per PTU Series)

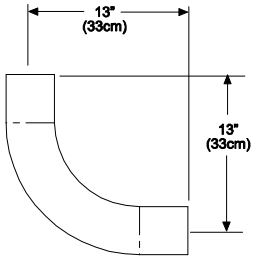
Contains:
End Reflector, #43320000.....*QTY–2*
Speed Clips, #02266010.....*QTY–4*



END REFLECTOR

B) Elbow Accessory Package, Part #43208010
(Option for PTS Series Only)

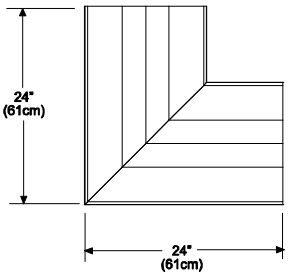
Contains:
Elbow, #431750010.....*QTY–1*
#10-16 x ½ Self-Drilling Screws, #02189020.....*QTY–2*
Tube Coupling, #30462980.....*QTY–1*



90 DEG. ELBOW

C) Corner Reflector Accessory Package, Part #43342000
(Option for PTS Series Only)

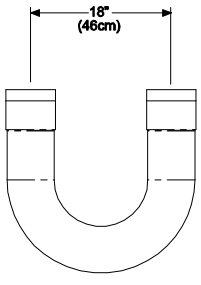
Contains:
Corner Reflector Assembly, #43345000.....*QTY–1*
Speed Clips, #02266010.....*QTY–4*



CORNER REFLECTOR

D) U-Bend Package, Part #43208020
(Option for PTU Series Only)

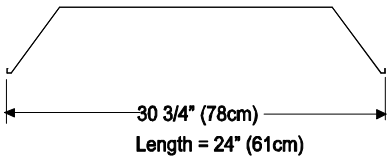
Contains:
U-Bend, #42913020.....*QTY–1*
#10-16 x ½ Self-Drilling Screws, #02189020....*QTY–2*
Tube Coupling, #30462980.....*QTY–1*
31" Hanger/Tube Support, #43318500.....QTY–1



180 DEG. U-BEND

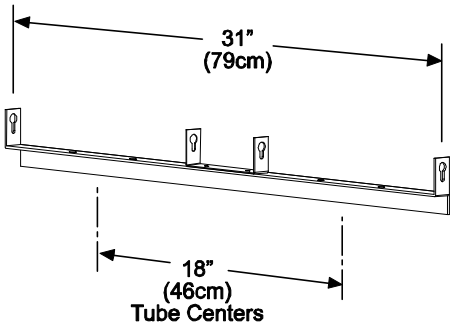
E) U-Bend Reflector Package, Part #43488000
(Option for PTU Series Only)

Contains:
U-Bend Reflector, #43490000.....*QTY–1*
U-Bend End Reflector, #43490050.....*QTY–1*
Speed Clips, #02266010.....*QTY–11*
#10-16 x ½ Self-Drilling Screws, #02189020.....*QTY–4*



U-BEND REFLECTOR

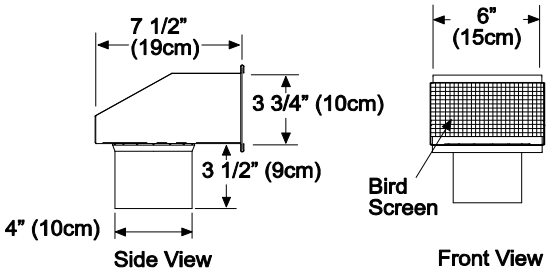
F) 31" Hanger/Tube Support, Part #43318500
(Option for Angle Mounting of PTU Series)



HANGER/TUBE SUPPORT

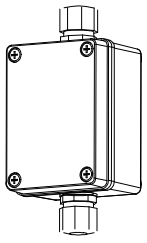
G) Exhaust Hood Package, Part #42924000

Contains:
Exhaust Hood Assembly, #42925540.....*QTY–1*
#10-16 x ½ Self-Drilling Screws,#02189020..*QTY–2*



H) Relay Package, Part #44195000

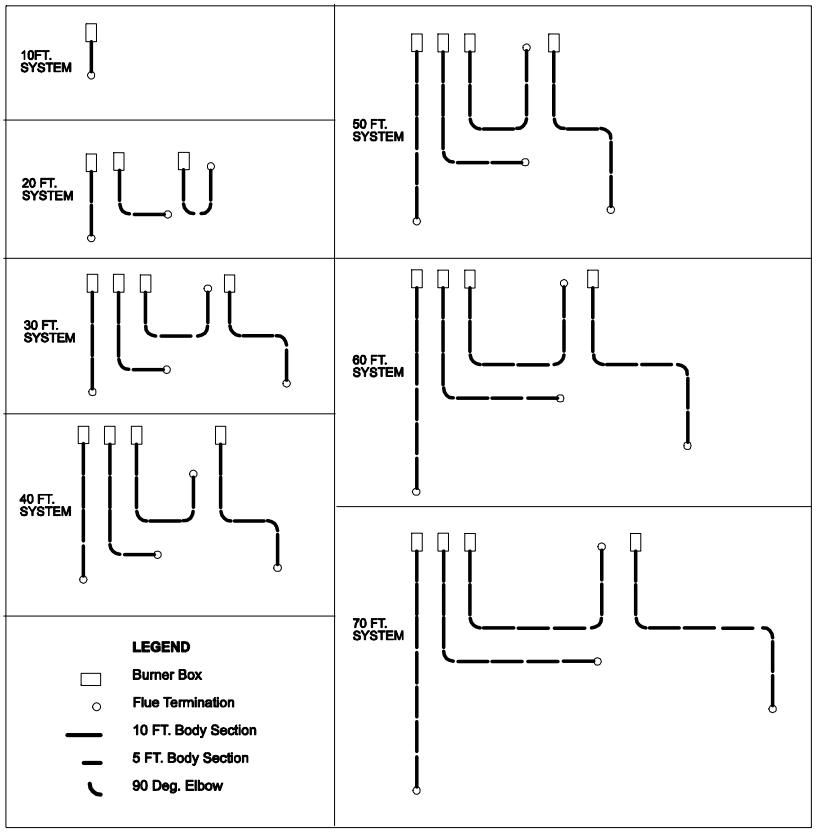
Contains:
Relay Board, #30740000.....QTY–1
ABS Enclosure, #30709059.....QTY–1
Mounting Plate, #30709058.....QTY-1
Water Tight Connectors, #30635010....QTY-2
#6-32x5/8" Screws, #02242030.....QTY-2



7.0) TYPICAL LAYOUTS – PTS Series

☑ Straight ☑ U Shape
☑ L Shape ☑ Z Shape

MODEL	EMITTER LENGTH	
	Min.	*Max.*
PTS 40	10 Ft.	20 Ft.
PTS 50	20 Ft.	40 Ft.
PTS 75	20 Ft.	40 Ft.
PTS 100	30 Ft.	50 Ft.
PTS 125	30 Ft.	60 Ft.
PTS 150	40 Ft.	60 Ft.
PTS 175	50 Ft.	70 Ft.
PTS 200	50 Ft.	70 Ft.

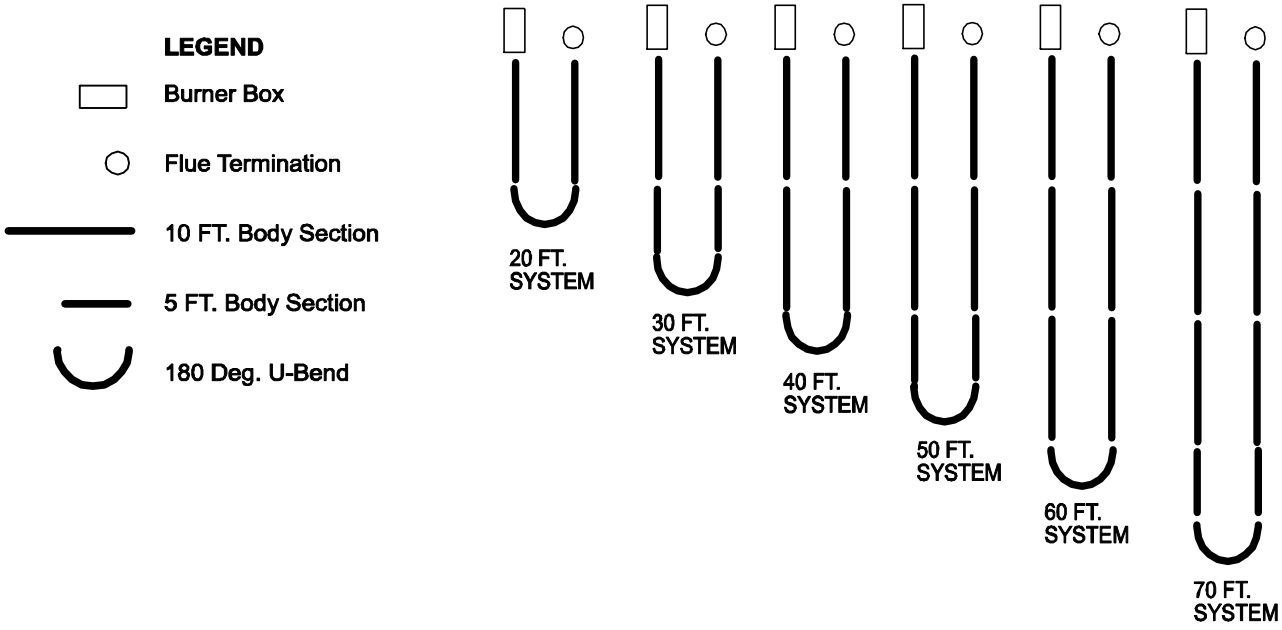


NOTES:

1) In all configurations, the control unit must be connected directly to either **a**) the 24-hole flange of the 10 ft. aluminized steel starting body section (for 10 ft., 20 ft., and 30 ft. systems) **or b**) the 6-hole flange of the 10 ft. alumi-therm steel starting body section (for 40 ft., 50 ft., 60 ft., and 70 ft. systems.
2) Joining of two 90º elbows directly together to form a "Z" shape IS NOT permitted.
3) PTS175-40 ft length available for special applications
4) 5 Ft. Body Packages may be utilized on any of these heaters to yield heater lengths from 15 ft. to 70 ft.
5) Any configuration of components not shown in the illustrations may be used except as noted in 1 and 2 above.

8.0) TYPICAL LAYOUTS – PTU Series

BODY LENGTH*	TOTAL EMITTER LENGTH	MODELS
10 Ft.	20 Ft.	PTU 40, 50, 75
15 Ft.	30 Ft.	PTU 50, 75, 100, 125
20 Ft.	40 Ft.	PTU 50, 100,125, 150
25 Ft.	50 Ft.	PTU 100, 125, 150, 175, 200
* Plus U-Bend		



NOTES:

1) In all configurations, the control unit must be connected directly to either **a**) the 24-hole flange of the 10 ft. aluminized steel starting body section (for 10 ft., 20 ft., and 30 ft. systems) **or b**) the 6-hole flange of the 10 ft. alumi-therm steel starting body section (for 40 ft., 50 ft., 60 ft., and 70 ft. systems).

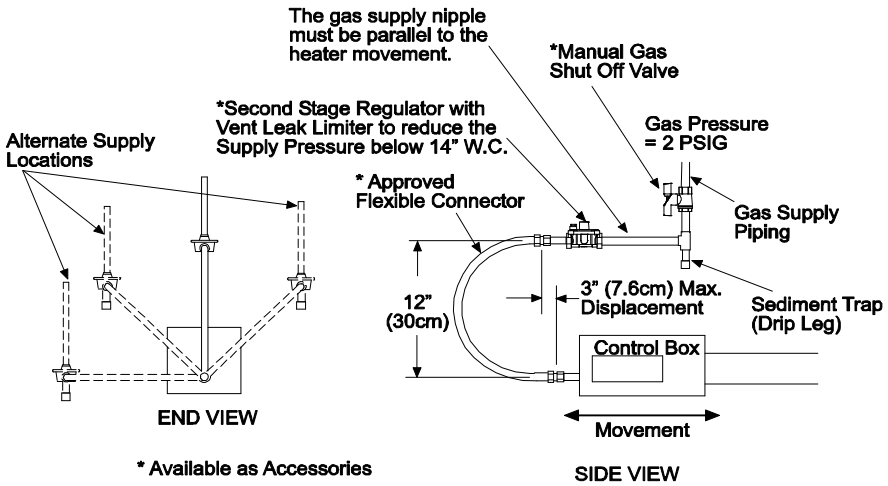
2) PTU175-40 ft length available for special applications.

9.0) GAS CONNECTIONS

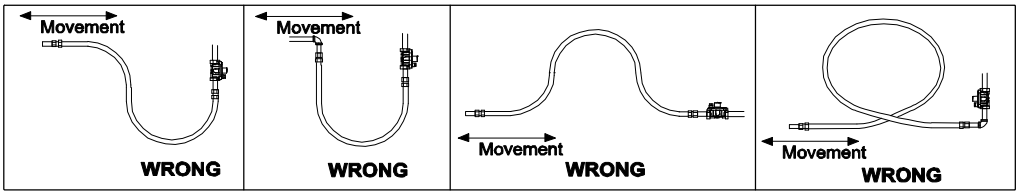
Certified connectors are recommended to be installed as shown, in one plane, and without sharp bends, kinks or twists. The gas take off from the drop line must be parallel to the burner gas inlet connection.

If the maximum supply pressure is less than ½ psig, a second stage regulator is not required.

CORRECT POSITIONS


The gas supply nipple must be parallel to the heater movement.
*Manual Gas Shut Off Valve
*Second Stage Regulator with Vent Leak Limiter to reduce the Supply Pressure below 14" W.C.
Gas Pressure = 2 PSIG
Alternate Supply Locations
* Approved Flexible Connector
Gas Supply Piping
12" (30cm)
3" (7.6cm) Max. Displacement
Sediment Trap (Drip Leg)
Control Box
END VIEW
Movement
* Available as Accessories
SIDE VIEW

INCORRECT POSITIONS



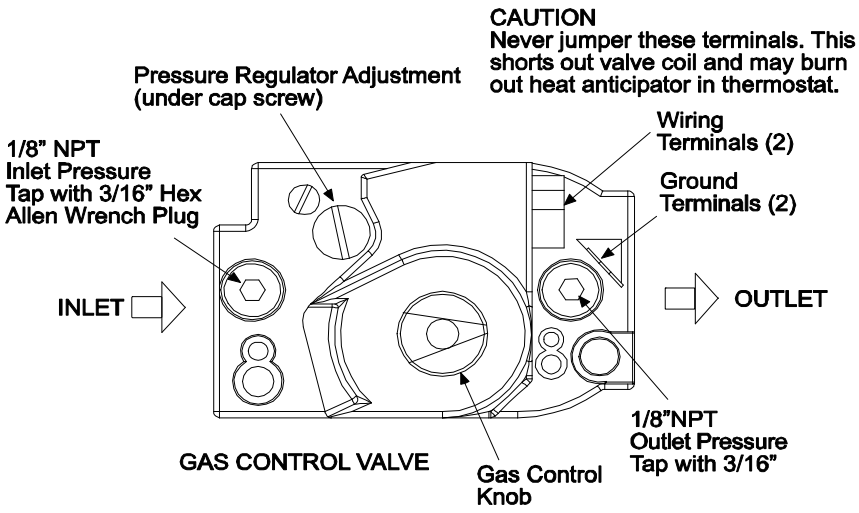
10.0) SINGLE STAGE - GAS PRESSURE TABLE

SUPPLY PRESSURE

1. The installer will provide a 1/8" N.P.T. plugged tapping, accessible for test gauge connection immediately upstream of the gas supply connection to the heater.

SINGLE STAGE - GAS PRESSURE TABLE			
GAS TYPE	MANIFOLD PRESSURE	SUPPLY PRESSURE	
		Minimum*	Maximum
Natural Gas	3.5" W.C.	5" W.C.	14" W.C.
Propane Gas	10.0" W.C.	11" W.C.	14" W.C.

* Minimum permissible gas supply pressure for purpose of input adjustment.

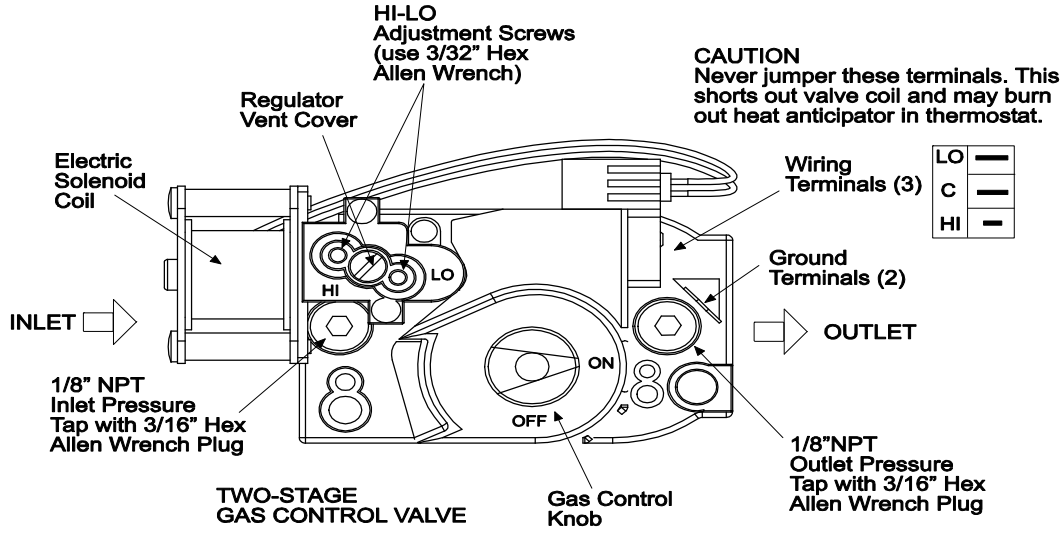

CAUTION
Never jumper these terminals. This shorts out valve coil and may burn out heat anticipator in thermostat.
Pressure Regulator Adjustment (under cap screw)
Wiring Terminals (2)
1/8" NPT Inlet Pressure Tap with 3/16" Hex Allen Wrench Plug
Ground Terminals (2)
INLET
OUTLET
1/8"NPT Outlet Pressure Tap with 3/16"
GAS CONTROL VALVE
Gas Control Knob

This appliance is equipped with a step-opening, combination gas valve. The maximum supply pressure to the appliance is 14" W.C. or 1/2 P.S.I. If the line pressure is more than the maximum supply pressure, then a second stage regulator, which corresponds to the supply pressure, must be used.

11.0) TWO STAGE - GAS PRESSURE TABLE

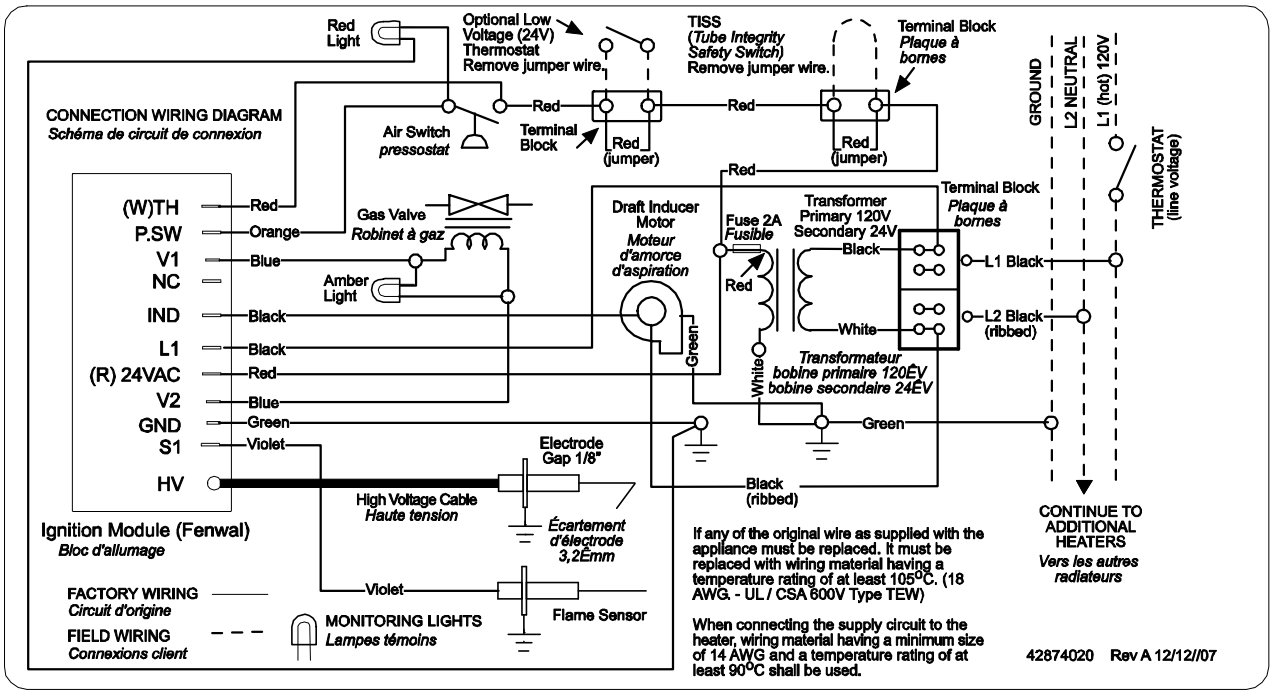
TWO STAGE - GAS PRESSURE TABLE				
GAS TYPE	MANIFOLD PRESSURE		SUPPLY PRESSURE	
	High	Low	Minimum*	Maximum
Natural Gas	3.5" W.C.	1.4" W.C.	5" W.C.[1]	14" W.C.
Propane Gas	10.0" W.C.	4.0" W.C.	11" W.C.[2]	14" W.C.

* Minimum permissible gas supply pressure for purpose of input adjustment.
[1] 7" W.C. for Models 150-200
[2] 12" W.C. for Model 200

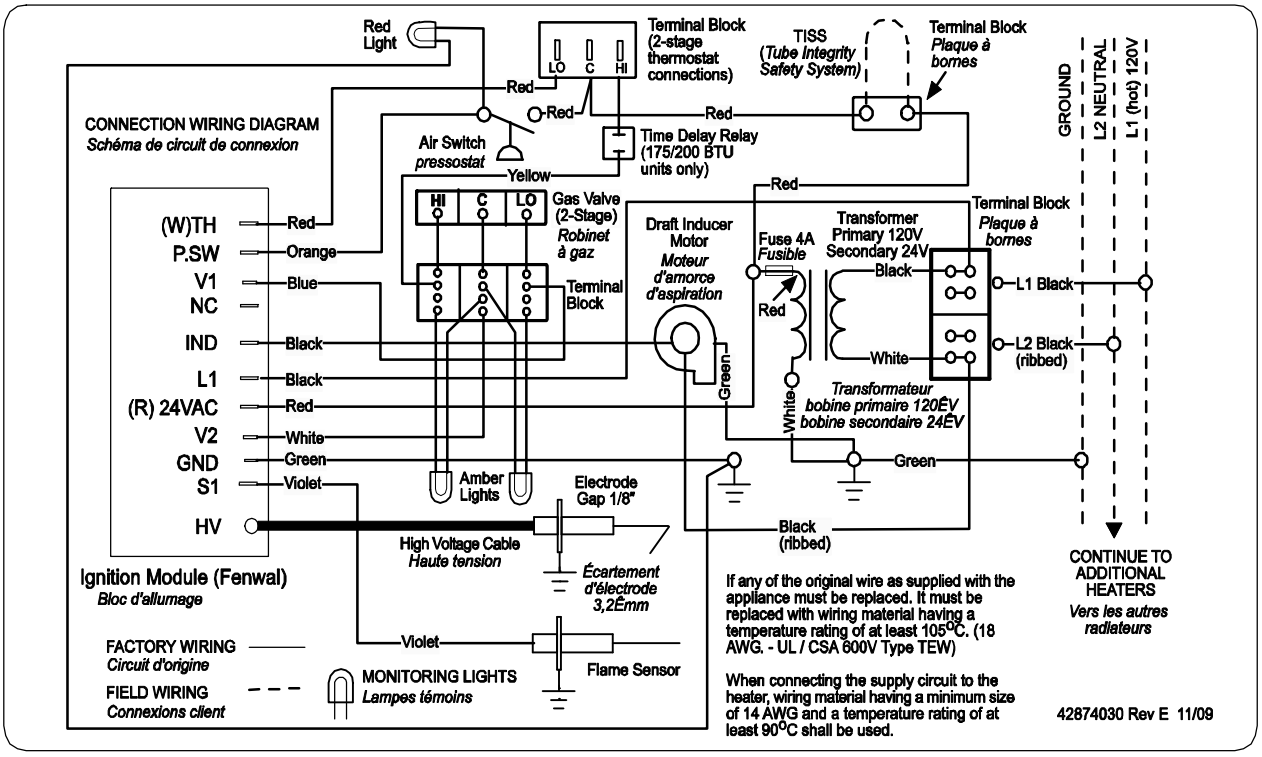


This appliance is equipped with a step-opening, combination gas valve. The maximum supply pressure to the appliance is 14" W.C. or 1/2 P.S.I. If the line pressure is more than the maximum supply pressure, then a second stage regulator, which corresponds to the supply pressure, must be used.

12.0) SINGLE STAGE - ELECTRICAL CONNECTIONS

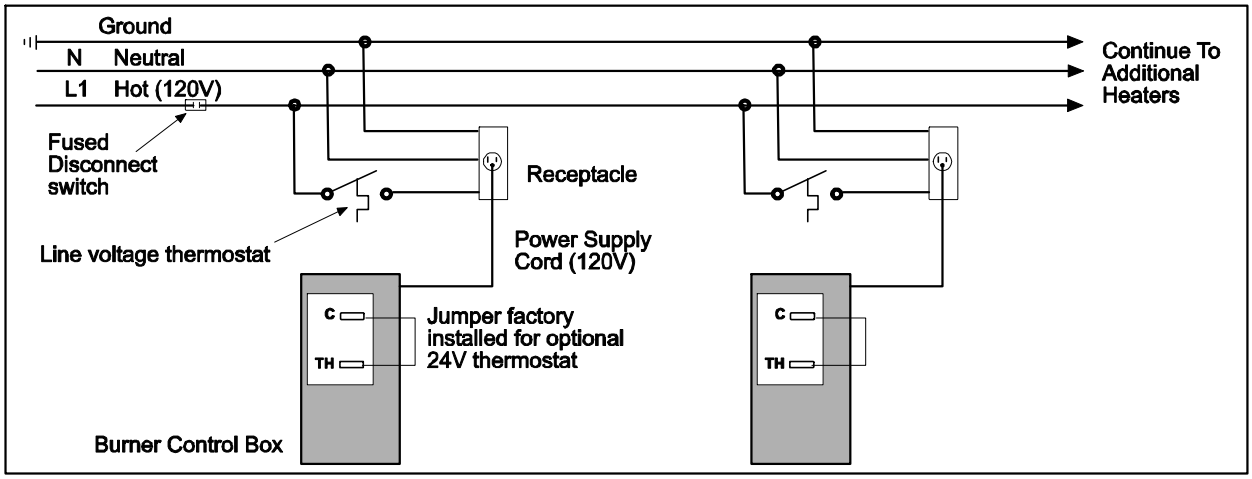


13.0) TWO STAGE - ELECTRICAL CONNECTIONS

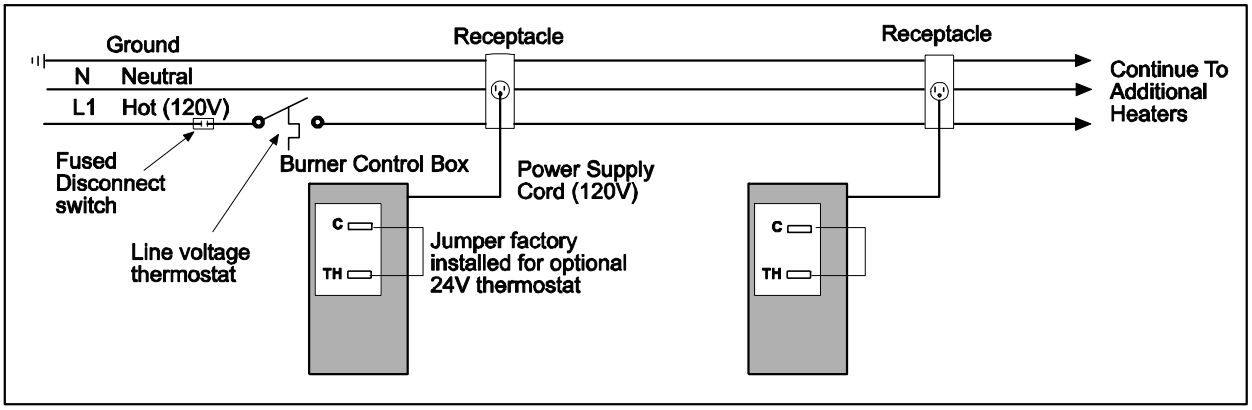


14.0) SINGLE STAGE-THERMOSTAT CONNECTION WIRING DIAGRAMS

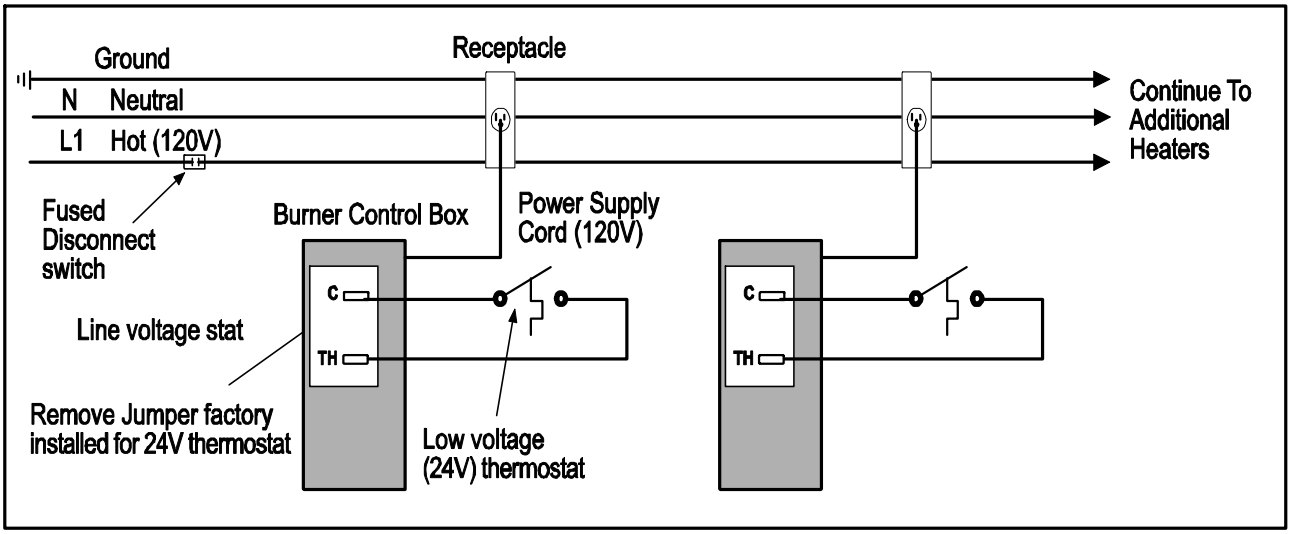
A. LINE VOLTAGE (120V) THERMOSTAT CONNECTIONS – SINGLE HEATER



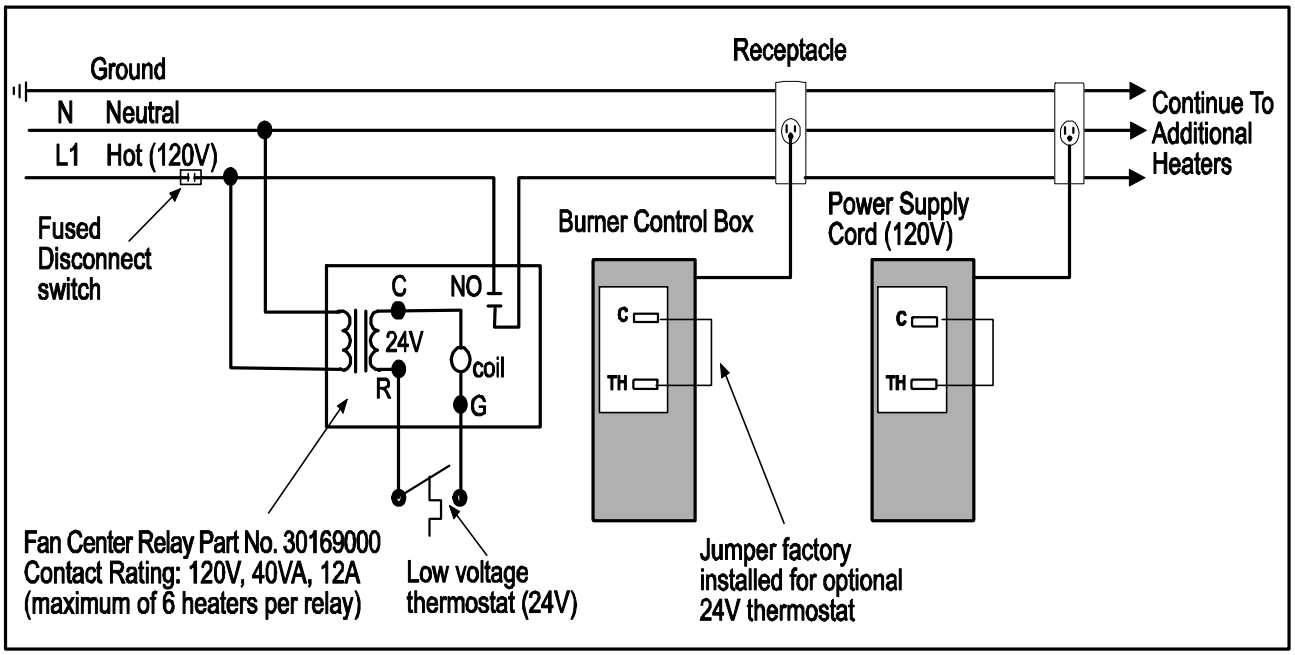
B. LINE VOLTAGE (120V) THERMOSTAT CONNECTIONS – MULTIPLE HEATERS



C. LOW VOLTAGE (24V) THERMOSTAT CONNECTIONS – SINGLE HEATERS

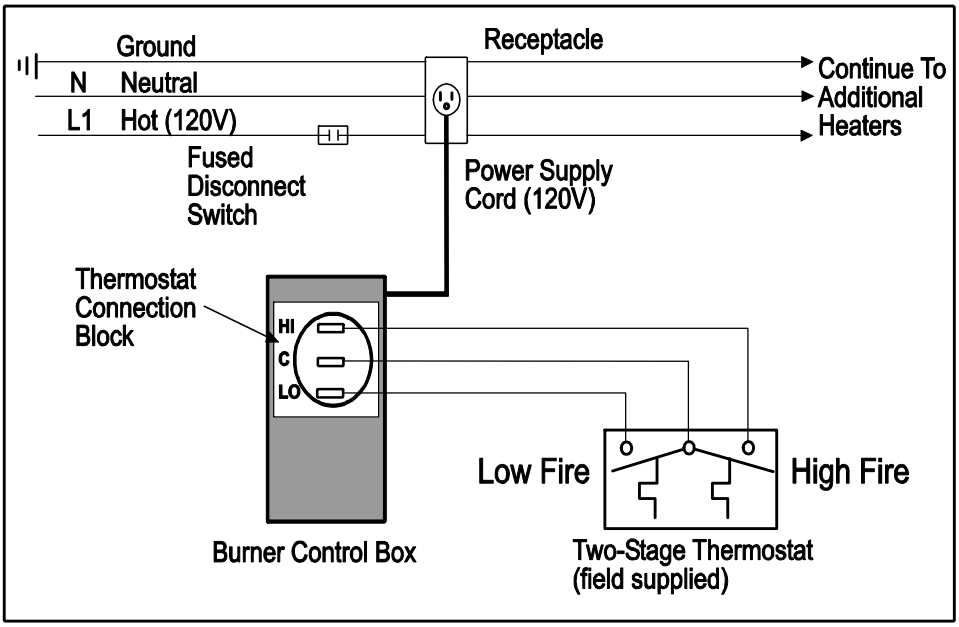


D. LOW VOLTAGE (24V) THERMOSTAT CONNECTIONS – MULTIPLE HEATERS (utilizing a fan center relay)

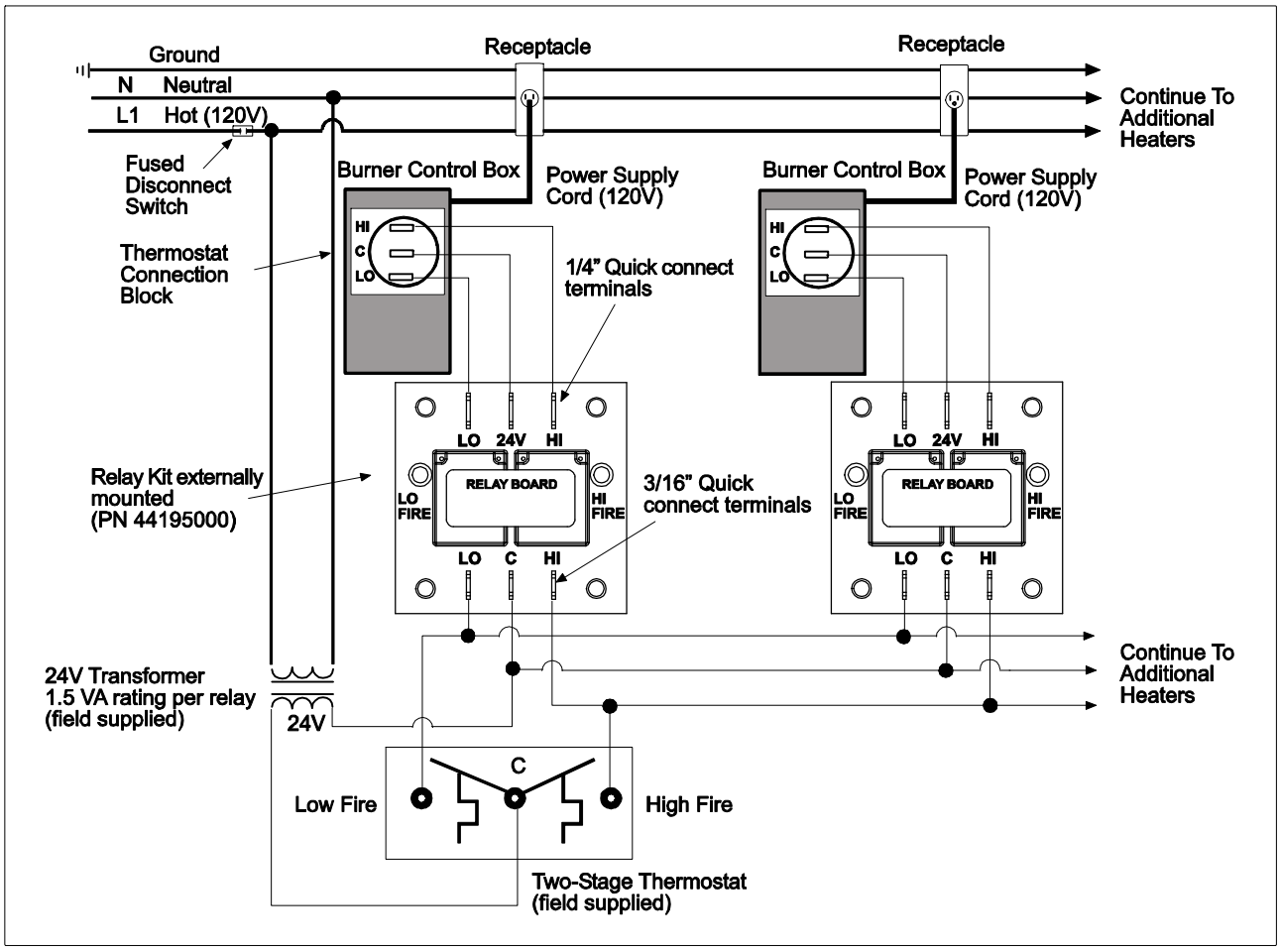


15.0) TWO STAGE - THERMOSTAT CONNECTION WIRING DIAGRAMS

A. LOW VOLTAGE (24V) THERMOSTAT CONNECTIONS – SINGLE HEATER



B. LOW VOLTAGE (24V) THERMOSTAT CONNECTIONS – MULTIPLE HEATERS



16.0) VENTING

A. BASIC FLUE VENTING — Venting must comply with the latest edition of the National Fuel Gas Code (ANSI Z223.1-latest edition) or the authority having jurisdiction. Other venting references are in the equipment volume of the ASHRAE Handbook.

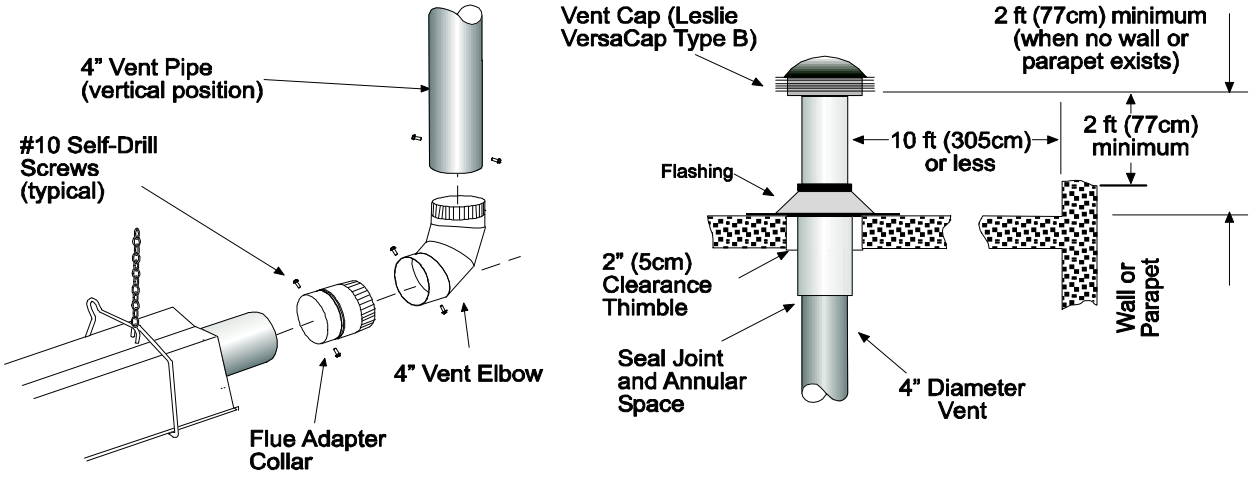
Vent lengths shown in the table are for horizontal and vertical venting. If a longer length of vertical or horizontal venting is required contact the manufacturer for assistance with vent sizing.

Model	Heat exchanger length ft	Maximum vent length ft. (4" diameter)	Maximum Fresh air intake length ft (4" diameter)	Max. combination of fresh air and vent ft. (4" diameter)
PTS/U 40	20	45	50	75
PTS/U 50	20	45	50	75
PTS/U 50	30	35	40	65
PTS/U 50	40	25	30	55
PTS/U 75	20	45	50	75
PTS/U 75	30	35	40	65
PTS/U 75	40	25	30	55
PTS/U 100	30	45	50	75
PTS/U 100	40	35	40	65
PTS/U 100	50	25	30	55
PTS/U 125	30	60	50	75
PTS/U 125	40	50	40	65
PTS/U 125	50	40	30	55
PTS/U 125	60	30	20	45
PTS/U 150	40	60	50	75
PTS/U 150	50	50	40	65
PTS/U 150	60	40	30	55
PTS/U 175	50	60	50	75
PTS/U 175	60	50	40	65
PTS/U 175	70	40	30	55
PTS/U 200	50	60	40	65
PTS/U 200	60	50	30	55
PTS/U 200	70	40	30	45

SINGLE HEATER VENTING (VERTICAL THROUGH THE ROOF)

1. When venting the heater to outside of building through a roof, use single-wall metal pipe. This is to be constructed of galvanized sheet metal or other approved noncombustible corrosion-resistant material as allowed by state or local codes.
2. A vent passing through a combustible roof shall extend through an approved clearance roof thimble. Double-wall, Type B vent must be used for the portion of the vent system which passes through the roof. An approved vent cap (Leslie "VersaCap"-Type B or equal) must be attached to end of the flue.
3. The maximum equivalent length of vent pipe should be carefully observed. A safety switch in the heater is designed to shut the heater off before excessive flue restriction causes bad combustion. Refer to the Vent Sizing Table for maximum vent lengths and vent pipe diameter.
4. Joints between sections of piping shall be fastened by sheet metal screws or other approved means and should be sealed to prevent leakage of flue gas into building. Aluminum or Teflon tape suitable for 550°F (3M Company tapes 433 or 363) or silicone sealant is recommended.
5. All portions of the vent pipe shall be supported to prevent from sagging (6' spacing is recommended).
6. When the vent pipe passes through areas where the ambient temperature is likely to induce condensation of the flue gases, the vent pipe should be insulated and a condensation drain should be provided.
7. Minimum clearance for single-wall flue pipe to combustible material shall be 6 inches. This may be reduced when the combustible material is protected as specified in the National Fuel Gas Code or the authority having jurisdiction.

8. Single-wall metal pipe shall not originate in any unoccupied attic or concealed space and shall not pass through any attic, inside wall or concealed space, or through any floor. For the installation of a single-wall metal pipe through an exterior combustible wall, refer to latest edition of the National Fuel Gas Code or the authority having jurisdiction.
9. A venting system shall terminate at least 3 ft. above any forced air inlet located within 10 ft.



SINGLE HEATER VENTING (HORIZONTAL THROUGH SIDEWALL)

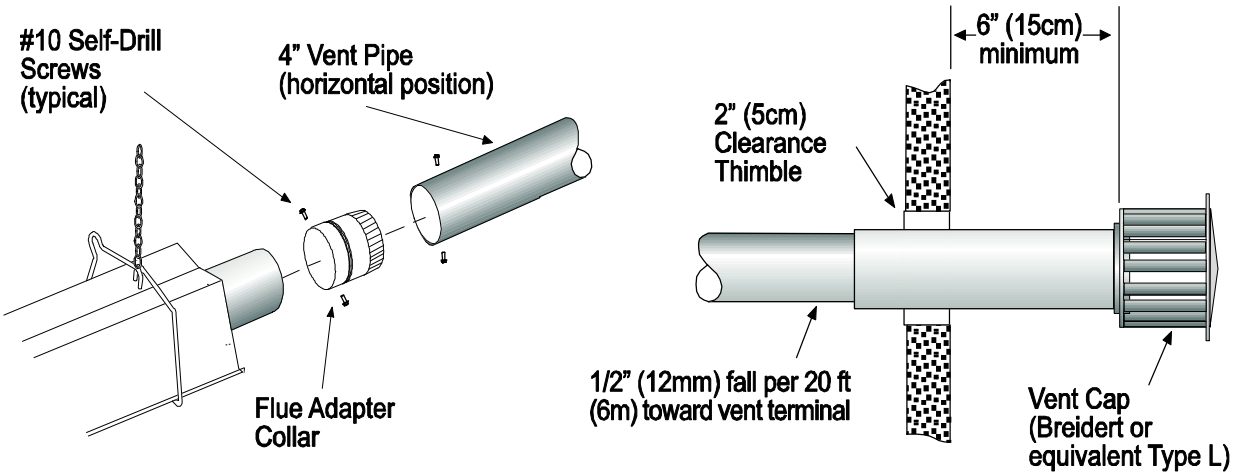
When venting the heater horizontally through a combustible outside sidewall, the same requirements listed previously for venting **Vertical Through The Roof** apply *except* as follows:

1. A vent passing through a combustible wall must pass through an approved clearance thimble (Air-Jet #4VT or Ameri-Vent #4EWT or other thimbles that are listed by a nationally recognized testing agency.
2. An approved vent cap (Breidert-Type L or equal) must be attached to the end of the vent pipe.

NOTE: To minimize problems associated with condensation in long horizontal runs, vent pipe can be insulated.

3. Use the following correction factors to obtain the equivalent length when elbows are used:
   c. Subtract 10 ft. for each elbow beyond 15 ft. from the heater.
   d. Subtract 15 ft. for each elbow within 15 ft. of the heater.
4. Limit to (2) 90° elbows in the vent system.
5. When venting through a sidewall, the horizontal vent pipe shall fall not less than 1/2 inch per 20 feet from the start of the vent system to the vent terminal. All portions of the vent pipe shall be supported to prevent sagging. (6' spacing is recommended)
6. A minimum clearance of 6 inches must be maintained between the outside wall and vent cap.

7. The horizontal venting system shall not terminate:
   a. Less than 4 ft. (1.2m) below, 4 ft. (1.2m) horizontally from or 1 ft. (30cm) above any door, operable window or gravity air inlet into any building. The bottom of the vent terminal shall be located at least 7 ft. (2.1m) above grade or above snow accumulation level as determined by local codes.
   b. Less than 3 ft. (0.9m) from a combustion air inlet.
   c. Less than 3 ft. (0.9m) from any other building opening or any gas service regulator.
   d. Less than 7 ft. (2.1m) above public walkways.
   e. Directly over areas where condensate or vapor could create a nuisance or hazard or be harmful to the operation of gas utility meters, regulators, relief valves, or other equipment. Building materials should be protected from flue gases and condensate.
8. In regions of the country where prevailing winds are consistently higher than 40 mph, it may be necessary to terminate the vent system above the roof level.

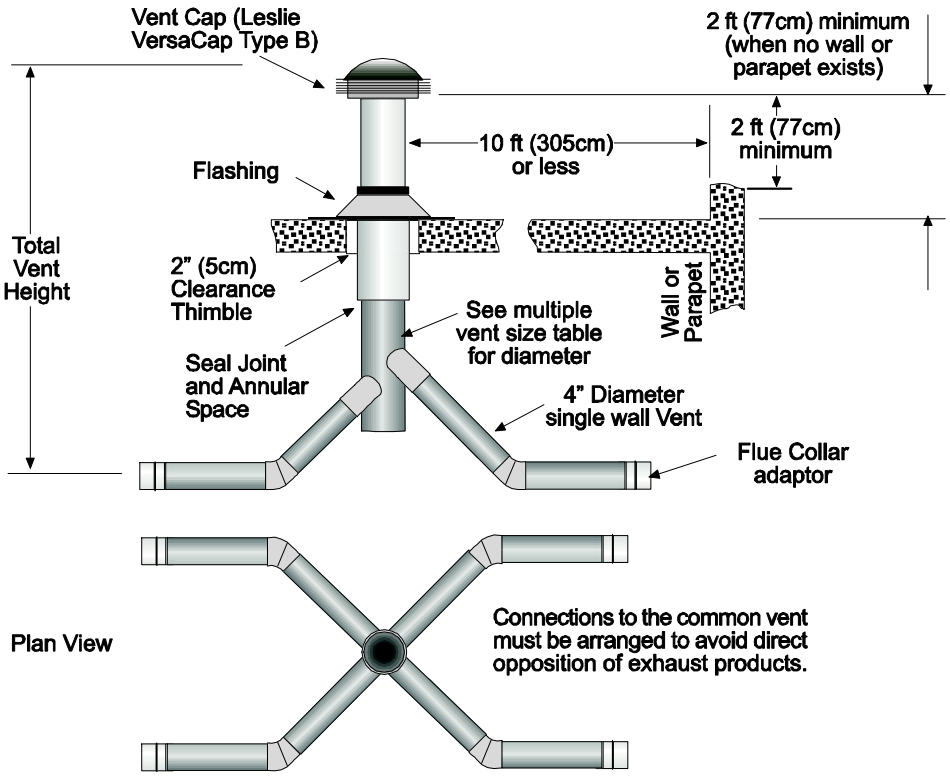


MULTIPLE HEATER VENTING (CONNECTIONS INTO A COMMON VENT OR MANIFOLD)

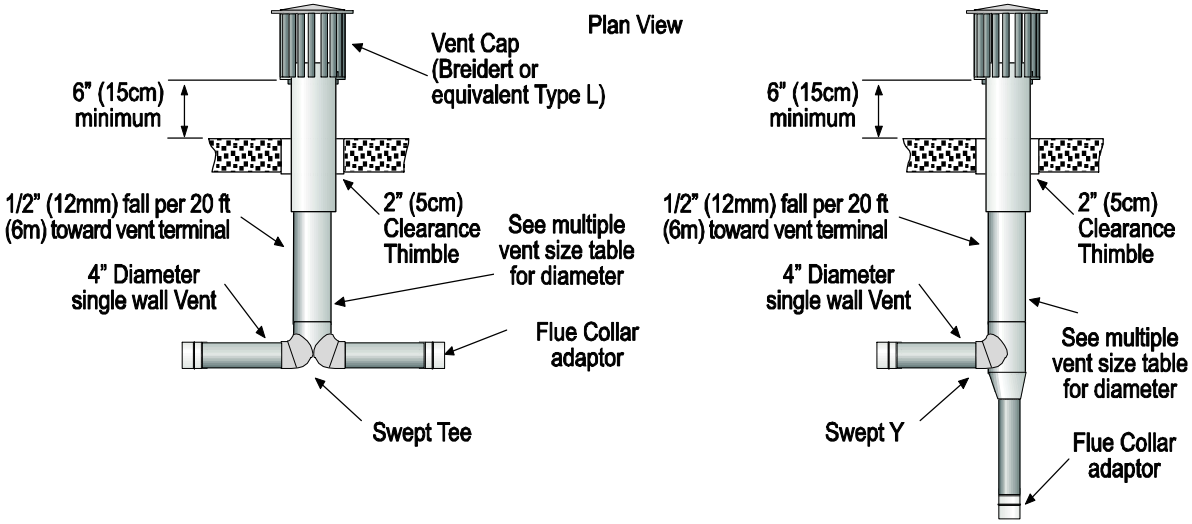
Requirements for venting of multiple heaters are the same as described for **SINGLE HEATER VENTING** *except* as follows:

1. The common vent size and total vent height is normally determined by the number of heaters per common vent, length of horizontal connector runs, and connector rise. Connector lengths should be as short as possible and have a minimum 1/2 inch per 20 foot fall. Without regard to connector rise and total vent height due to many possible venting configurations, the following should be observed:
   a. Common vent pipe & vent connector diameter should be no less than that shown in the following Vent Sizing Table.
   b. The connector length should be no more than 75% of the vertical portion of vent above the connector.
   c. Where possible, use a Y-connector to the common vent.
2. Material for connectors should be constructed of galvanized sheet metal or other approved noncombustible corrosion resistant material as allowed by state or local codes. All common vent pipe should be double wall, Type B vent.
3. Avoid unnecessary bends. Limit to two (2) 90° elbows.
4. The entire length of vent connector shall be readily accessible for inspection, cleaning and replacement.
5. Groups of heaters with a common vent must be controlled by a common thermostat.

Multiple Heater Vertical venting arrangement.

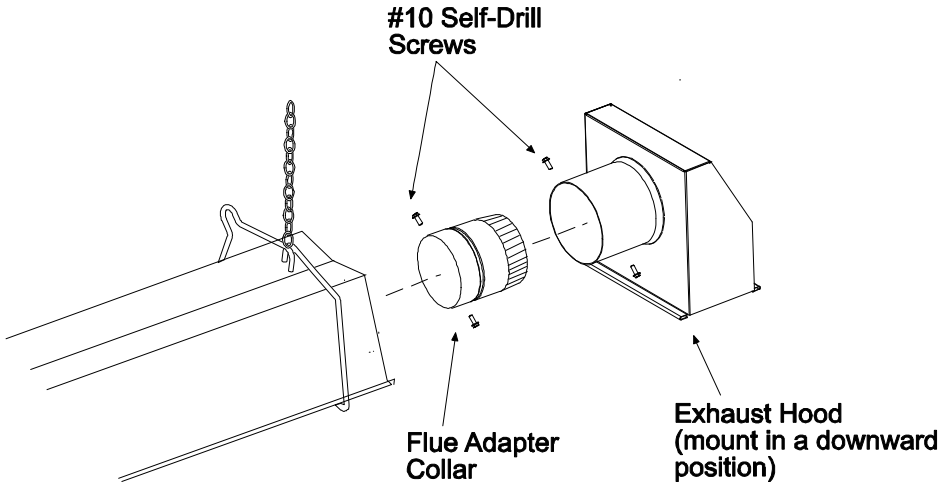

Vent Cap (Leslie VersaCap Type B)
2 ft (77cm) minimum (when no wall or parapet exists)
10 ft (305cm) or less
2 ft (77cm) minimum
Flashing
Total Vent Height
2" (5cm) Clearance Thimble
See multiple vent size table for diameter
Wall or Parapet
Seal Joint and Annular Space
4" Diameter single wall Vent
Flue Collar adaptor
Plan View
Connections to the common vent must be arranged to avoid direct opposition of exhaust products.

Multiple Heater Horizontal venting arrangement.


Plan View
Vent Cap (Breidert or equivalent Type L)
6" (15cm) minimum
1/2" (12mm) fall per 20 ft (6m) toward vent terminal
2" (5cm) Clearance Thimble
See multiple vent size table for diameter
4" Diameter single wall Vent
Flue Collar adaptor
Swept Tee
6" (15cm) minimum
1/2" (12mm) fall per 20 ft (6m) toward vent terminal
2" (5cm) Clearance Thimble
4" Diameter single wall Vent
See multiple vent size table for diameter
Swept Y
Flue Collar adaptor

VENT SIZING TABLE — Multiple Heater Venting				
	Number of Heaters			
	Horizontal and vertical		Vertical Only	
	1	2	3	4
PTS/PTU 40	4"	4"	4"	4"
PTS/PTU 50	4"	4"	4"	5"
PTS/PTU 75	4"	4"	5"	6"
PTS/PTU 100	4"	5"	6"	6"
PTS/PTU 125	4"	5"	6"	7"
PTS/PTU 150	4"	6"	7"	7"
PTS/PTU 175	4"	6"	7"	8"
PTS/PTU 200	4"	6"	7"	8"
	COMMON VENT DIAMETER (If a size is not available use the next larger size.)			

B. INDIRECT VENTING (UNVENTED HEATERS) — This heater requires ventilation in the building to dilute the products of combustion and provide fresh air for efficient combustion. Where unvented heaters are used, gravity or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1,000 Btu/hr input of installed heaters. Exhaust vents must be located at the highest point above and in the vicinity of the heaters, and the inlet vents must be located below the level of the heaters. An exhaust hood (Part #42924000) must be placed on the flue adapter collar located on the end of the last body section when used unvented and must be mounted only in an downward position as shown.



Exhaust Hood Attachment (for UNVENTED use)

17.0) AIR FOR COMBUSTION

If indoor combustion air is to be supplied for a tightly enclosed area, one square inch of free area opening shall be provided below the heater for each 1,000 Btu/hr of heater input. Adequate clearances around the air inlet screen must be maintained at all times. In larger open areas of buildings, infiltration normally is adequate to provide air for combustion.

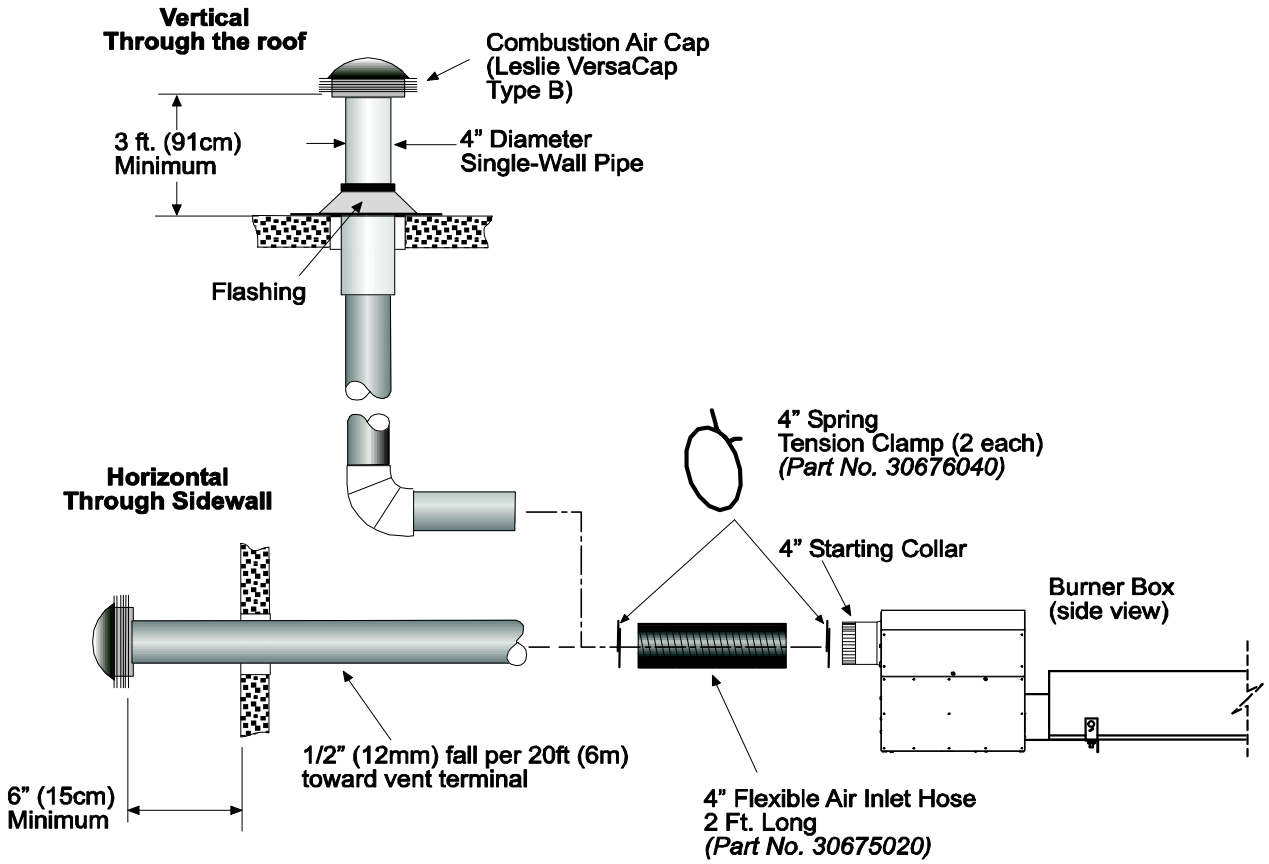
18.0) DIRECT OUTSIDE AIR FOR COMBUSTION

Outside combustion air should be supplied directly to the heater when the building is subject to negative pressure, or when contaminants or high humidity are present in the building air. These contaminants include paints, solvents, corrosive vapors or any other foreign particles that may cause damage to the heater or result in poor combustion.

Outside combustion air can be brought directly to the heater by a 4" diameter□duct less than 50 ft. long or equivalent (see table in Section 16). This is attached to the 4" diameter starting collar (supplied with heater). The starting collar is fitted to the rear of the burner box cabinet as shown below. An approved vent cap must be placed directly on the end of the outside combustion air inlet pipe. The combustion air inlet should be not less than 3 ft. (0.9m), either vertically or horizontally, from the flue vent termination. The air intake terminal must be located not less than 1 ft. (30cm) above grade. It is good installation practice to supply combustion air from the same pressure zone as the vent outlet. Avoid bringing combustion air to the heater from an attic space. There is no guarantee that adequate combustion air will be supplied.

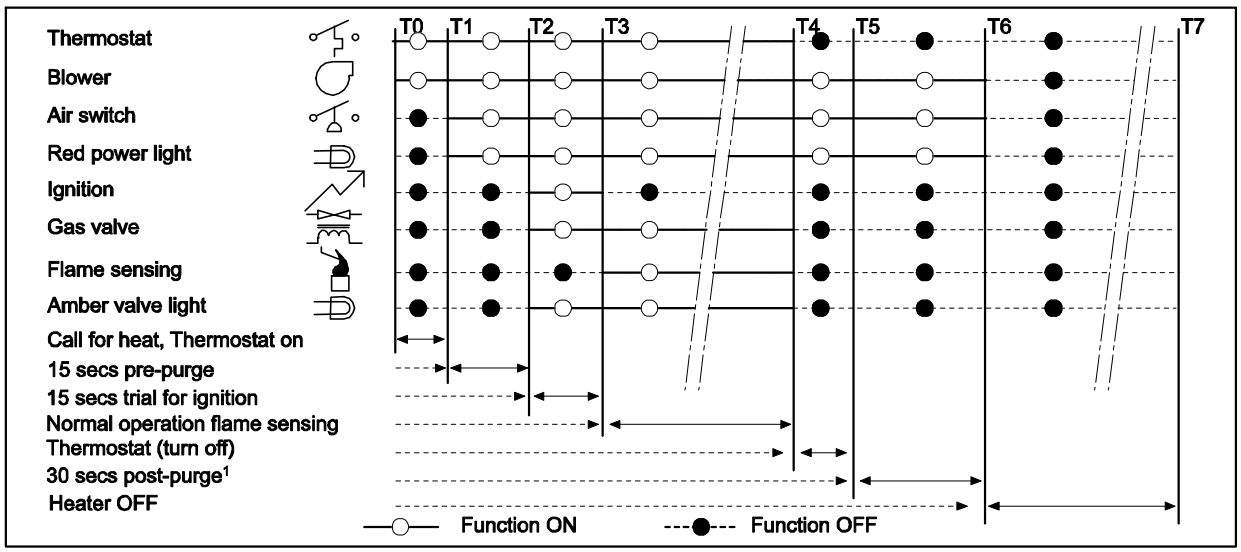
If the heater is installed less than 2 ft. from the ceiling, a combustion air inlet kit PN 44129510 must be provided to allow for expansion/contraction of straight tube heaters (PTS series).

In colder climates, where necessary, insulate the outside combustion air duct. In high humidity applications, the burner box should be sealed with silicone sealer.



19.0) SINGLE STAGE - SEQUENCE OF OPERTATIONS

The chart below shows the sequence of operation for the normal operating cycle.

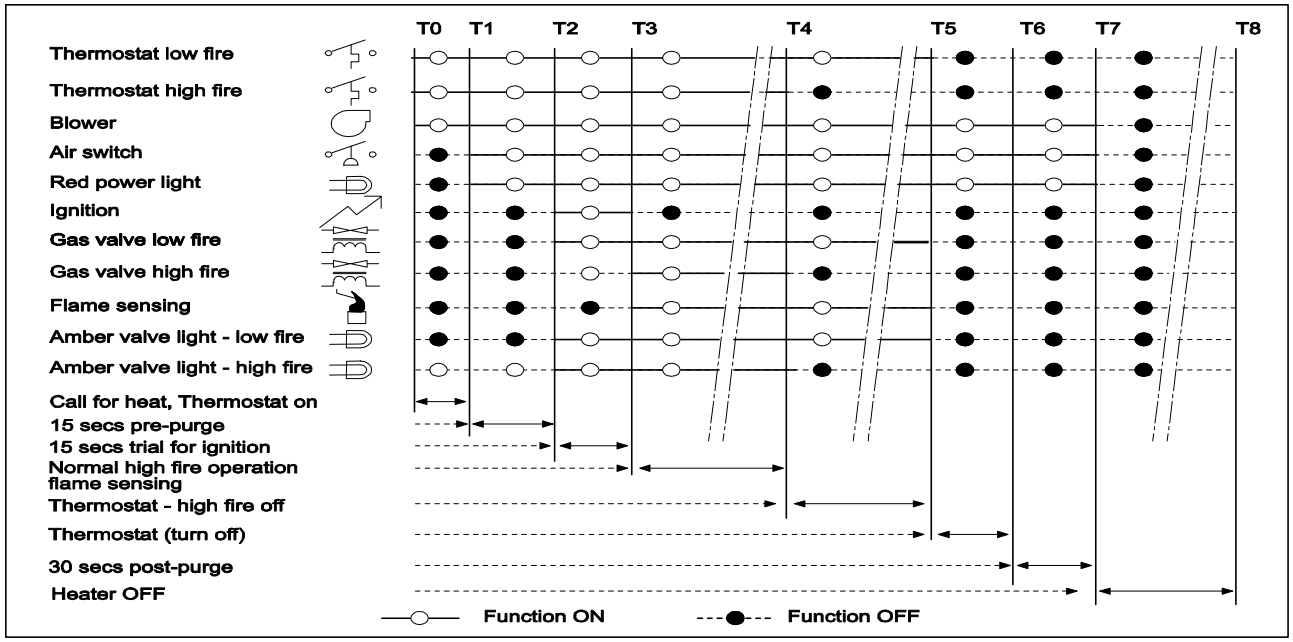


Note: When the PTS / PTU is operated by a thermostat interrupting the line voltage (120V) to the heater then the post purge function is disabled.

If the flame is not sensed during sequence T3 then the burner will automatically begin re-ignition sequence T2. The ignition sequence will be repeated three times with a 60 second inter-purge. If the flame is not re-established the heater will go to lockout.

20.0) TWO STAGE - SEQUENCE OF OPERTATIONS

The chart below shows the sequence of operation for the normal operating cycle of the PTS/PTU when connected to a permanent 120V power supply and the heater is turned on and off by a remote 24V thermostat. (Electrical connection diagram C).



If the flame is not sensed during sequence T3 then the burner will automatically begin re-ignition sequence T2. The ignition sequence will be repeated three times with a 60 second inter-purge. If the flame is not re-established the heater will go to lockout

21.0) LIMITED WARRANTY

LIMITED WARRANTY: Gas-Fired Products, Inc., the manufacturer, warrants to the original owner of any Space-Ray infrared gas heater that said heater will be free from defects in material or workmanship under normal use and service. The heater(s) shall be installed, used and maintained strictly in accordance with the manufacturer's instructions. The manufacturer's sole obligation under this warranty shall be limited to furnishing replacement parts, F.O.B. Charlotte, NC, for 12 months from the date of installation, or 18 months from the date of shipment by the manufacturer, whichever period shall expire first. Labor charges for removal of defective parts and the installation of the replacement parts are not included. This warranty applies only within the USA and Canada.

WARNING: Manufacturer's warranty shall not apply: (a) to damage to the heater when used in an atmosphere containing halogenated hydrocarbons or other corrosive chemicals. Some compounds in the air can be ingested into the equipment and can cause an accelerated rate of corrosion of some of the parts of the heating components. The use of such chemical compounds in or near the operating environment of the heater should be avoided where a longer heater life is desirable; (b) to any heater or components which have been repaired or replaced with other than factory parts, modified in any way, misused or damaged, or which have been used contrary to the manufacturer's written instructions. Replacement parts are available through Space-Ray representatives or their distributors.

LIMITATION OF WARRANTY: THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. WITHOUT LIMITING THE FOREGOING, THE MANUFACTURER EXPRESSLY EXCLUDES ANY AND ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTY OF MERCHANTABILITY FOR ITS PRODUCTS.

If any provision of this warranty is found to be void, unenforceable or unconscionable, then the same is hereby severed and the remainder of this warranty is hereby saved and shall remain in force.

EXCLUSIVE REMEDY: The sole and exclusive remedy under this warranty is the replacement of the defective parts or heaters as hereinabove specified. THE MANUFACTURER DOES HEREBY EXPRESSLY EXCLUDE ANY AND ALL LIABILITY FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES UNDER THIS OR ANY OTHER WARRANTY. Without intending to limit the aforesaid exclusion, THE MANUFACTURER DOES HEREBY EXCLUDE ANY LIABILITY UNDER THIS OR ANY OTHER WARRANTY FOR INJURIES AND COMMERCIAL LOSSES TO PROPERTY THAT RESULT FROM THE OPERATION, PROPER OR IMPROPER, OF ITS PRODUCTS.

ADDITIONAL WARRANTY ON HEAT EMITTING SURFACE AND BURNER: Manufacturer warrants to the original owner of any CSA design certified heater that, if installed, used and maintained strictly in accordance with the printed instructions received with the heater, the manufacturer will at any time during the below listed time periods, furnish at no cost to the original owner, replacement emitters or burners which have become inoperative by reason of any defect in our workmanship, materials or construction. The manufacturer's obligation under this warranty shall be limited to furnishing replacements under the following time periods from the date of installation:

	Emitter	Burner
PTS, PTU Series:	3 Years	10 Years

The manufacturer will not be responsible for labor charges incurred for removal or installation of emitters. Any transportation charges involved in the return or repair are excluded.

ADDITIONAL TERMS: Manufacturer assumes no liability for delay in performing its obligations under the aforesaid warranty. Manufacturer assumes no liability for failure in performing its obligations thereunder if failure results directly or indirectly from any cause beyond its control, including but not limited to acts of God, acts of Government, floods, fires, shortages of materials, strikes and other labor difficulties or delays or failures of transportation facilities.

This is a Non-Residential product (excluding the CB Series which is certified for residential and non-residential use). Installation and service shall be by a Licensed Contractor and in accordance with National and Local Codes.

When presenting warranty claims, proof of date of purchase must be submitted.
No Representative is authorized to assume for the manufacturer any liability except as set forth above.

SPACE-RAY®
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